

Metric Tracking Data Evaluation (MTDE) Support for STS

What is Tracking Data?

- Tracking data consists of angle, range, and range-rate measurements between the Shuttle and a tracking antenna located either on the ground or in space.
- Stations with tracking antennas that transmit Shuttle tracking data to the Flight Dynamics Facility (FDF):
 - Space Network (SN) Stations
 - White Sands, New Mexico
 - Guam Island
 - Ground Network (GN) Stations
 - Merritt Island, Florida
 - Santiago, Chile
 - NASA and DOD radars



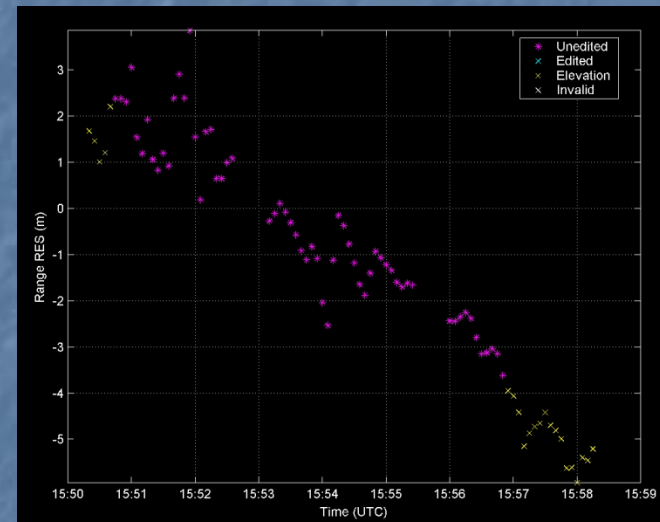
Ground Station Antenna

What does MTDE do with tracking data?

- MTDE uses tracking data to perform network validation and calibration.
 - Network validation assures high quality tracking data from GN/SN by:
 - detecting problems
 - isolating causes to the lowest subsystem possible
 - working with network personnel to correct the problems
 - Network calibration characterizes the performance of individual trackers, antennas, and networks by maintaining:
 - a database of GN performance statistics
 - a database of SN performance statistics
- MTDE uses tracking data to perform orbit determination (OD)
 - Goddard Trajectory Determination System (GTDS) is the orbit determination software used by MTDE personnel to evaluate the data.

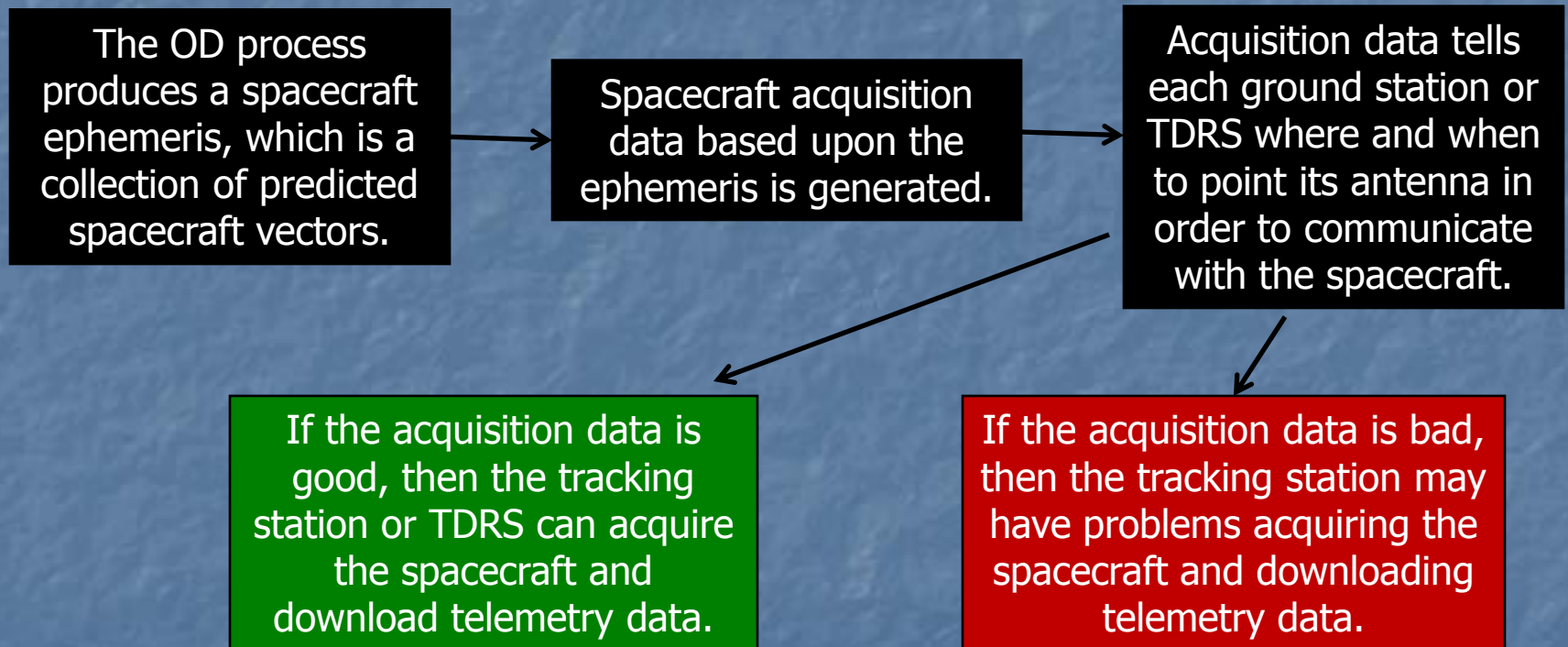
How are tracking data residuals used?

- MTDE personnel analyze tracking data residuals to detect network problems, which are known as anomalies.
- Some typical anomalies are:
 - Biases
 - Drifts
 - Oscillations
 - Spikes
 - Incorrect time-tags
 - Excessive noise
- MTDE personnel notify SN personnel at White Sands, Houston Nav, GN personnel at Wallops and other tracking stations about tracking data anomalies that could adversely affect orbit determination and spacecraft acquisition.



How does tracking data relate to spacecraft acquisition?

- Tracking data is used to determine the orbits of the spacecraft.



- Thus acquisition data based upon poor quality tracking data could cause a loss of spacecraft acquisition and telemetry data.

STS Support by MTDE

- MTDE personnel participate in STS pre-launch data flows
- MTDE personnel provide tracking data validation and calibration for all STS missions.
- MTDE personnel provide orbit determination for STS using real-time automation software SS2T.
- MTDE personnel produce a daily STS Report which
 - Provides tracking data analysis information for each STS tracking event supported by TDRS
 - Provides a description of STS tracking data anomalies
 - Contains daily and mission statistics summarized for each TDRS